Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A method comprising:

observing a finite duration signal y_n having N samples that comprises a representation of a mixture of a desired signal and an undesired signal, in which the desired signal is a function of at least one unknown signal parameter θ and the undesired signal ~~comprising~~ comprises an offset component based on interference of an external interference source;

modeling the offset component of the undesired signal as comprising a step function u defined by unknown step function parameters that include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude;

estimating jointly the unknown signal parameter θ and the unknown step function parameters $c1$, $c2$, and α $(0 \leq \alpha < N)$ based on a non-linear optimization method; and

adjusting y_n based on the estimated step function parameters.

2. (Currently amended) The method of claim [[1]] 44 in which y_n ~~comprises~~ is based on a continuous signal.

3. (Currently amended) The method of claim [[1]] 44 in which y_n ~~comprises~~ is based on a discrete signal.

4. (Canceled)

5. (Currently amended) The method of claim [[1]] 44 in which the step function parameters include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude, and in which the desired signal is a function of at least one unknown signal parameter θ.

6. (Currently amended) The method of claim 5 in which ~~y_n includes N samples and~~ estimating the step function parameters includes jointly estimating θ, $c1$, $c2$, and α $(0 \leq \alpha < N)$ based on a non-linear optimization method.

7. (Currently amended) The method of claim 5 in which ~~y_n includes N samples and~~ estimating the step function parameters includes estimating $c1$, $c2$, and α $(0 \leq \alpha < N)$ based on a maximum likelihood method.

8. (Previously presented) The method of claim 7 in which the estimates of the step function parameters comprise:

a first estimate $\hat{c}1$ of $c1$ where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n \ ;$$

a second estimate $\hat{c}2$ of $c2$ where

$$\hat{c}2 \approx \frac{1}{N-\hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \ ; \text{ and}$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 , \ 0 \le \alpha_{Test} < N-1 .$$

9. (Original) The method of claim 8 in which determining $\hat{\alpha}$ comprises:

selecting more than one value of α_{Test};

determining a value g for each selected value of α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 ;$$

selecting from among the determined values of g one or more maximum values of g; and

selecting $\hat{\alpha}$ based on the one or more maximum values of g.

10. (Original) The method of claim 9 in which less than N values of α_{Test} are selected.

11. (Original) The method of claim 7 in which estimating the step function parameters further comprises jointly estimating θ, $c1$, $c2$, and α based on a non-linear minimization of a function comprising

$$f(\theta,c1,c2,\alpha) \approx \sum_{n=0}^{\alpha-1}\left|y_n - \frac{1}{\alpha}\sum_{m=0}^{\alpha-1} y_m - \frac{A_0}{2}s_m(\theta) + \frac{1}{\alpha}\sum_{m=0}^{\alpha-1}\frac{A_0}{2}s_m(\theta)\right|^2$$
$$+\sum_{n=\alpha}^{N-1}\left|y_n - \frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha} y_m - \frac{A_0}{2}s_n(\theta) + \frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha}\frac{A_0}{2}s_m(\theta)\right|^2$$

in which the minimization is performed by computing one or more of the derivatives of *f*.

12. (Currently amended) A system comprising:

an observation circuit structured and arranged to observe a finite duration signal y_n having N samples that comprises a discrete representation of a mixture of a desired signal and an undesired signal, in which the desired signal is a function of at least one unknown signal parameter θ and the undesired signal ~~comprising~~ comprises an offset component based on interference of an external interference source;

a modeling circuit structured and arranged to model the offset component of the undesired signal as comprising a step function *u* defined by unknown step function parameters that include a first parameter $c1$ indicative of a first amplitude of the step function, a second

parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude;

an estimating circuit structured and arranged to use a non-linear optimization method to determine jointly an estimated signal parameter and estimated step function parameters representative of the unknown signal parameter θ and the unknown step function parameters $c1$, $c2$, and α $(0 \leq \alpha < N)$; and

a correction circuit structured and arranged to correct y_n based on the estimated step function parameters.

13. (Currently amended) The system of claim [[12]] 45 in which y_n ~~comprises~~ is based on a continuous signal.

14. (Currently amended) The system of claim [[12]] 45 in which y_n ~~comprises~~ is based on a discrete signal.

15. (Canceled)

16. (Currently amended) The system of claim [[12]] 45 in which the unknown step function parameters include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third

parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude, and in which the desired signal is a function of at least one unknown signal parameter θ.

17. (Currently amended) The system of claim 16 in which ~~y_n includes N samples and~~ the estimating circuit is further configured to estimate jointly the unknown step function parameters θ, $c1$, $c2$, and α $(0 \leq \alpha < N)$ based on a non-linear optimization method.

18. (Currently amended) The system of claim 16 in which ~~y_n includes N samples and~~ the estimating circuit is further configured to estimate the unknown step function parameters $c1$, $c2$, and α $(0 \leq \alpha < N)$ based on a maximum likelihood method.

19. (Previously presented) The system of claim 18 in which the estimating circuit is further configured to estimate the unknown step function parameters as comprising:

a first estimate $\hat{c}1$ of $c1$ where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n ;$$

a second estimate $\hat{c}2$ of $c2$ where

$$\hat{c}2 \approx \frac{1}{N-\hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \text{ ; and}$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2, \ 0 \le \alpha_{Test} < N.$$

20. (Original) The system of claim 19 in which the estimating circuit is further configured to determine $\hat{\alpha}$ based on the following:

selecting more than one value of α_{Test};

determining a value g for each selected value of α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2;$$

selecting from among the determined values of g one or more maximum values of g; and

selecting $\hat{\alpha}$ based on the one or more maximum values of g.

21. (Original) The system of claim 20 in which less than N values of α_{Test} are selected by the estimating circuit.

22. (Original) The system of claim 18 in which the estimating circuit is further configured to estimate jointly the unknown step function parameters θ, $c1$, $c2$, and α based on non-linear minimization of a function comprising

$$f(\theta,c1,c2,\alpha) \approx \sum_{n=0}^{\alpha-1}\left|y_n - \frac{1}{\alpha}\sum_{m=0}^{\alpha-1}y_m - \frac{A_0}{2}s_m(\theta) + \frac{1}{\alpha}\sum_{m=0}^{\alpha-1}\frac{A_0}{2}s_m(\theta)\right|^2$$
$$+\sum_{n=\alpha}^{N-1}\left|y_n - \frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha}y_m - \frac{A_0}{2}s_n(\theta) + \frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha}\frac{A_0}{2}s_m(\theta)\right|^2$$

in which minimization is performed by computing one or more of the derivatives of *f*.

23. (Currently amended) A computer program stored on a computer readable medium or a propagated signal, the computer program comprising:

an observation code segment configured to cause a computer to observe a finite duration signal y_n <u>having N samples</u> that comprises a representation of a mixture of a desired signal and an undesired signal, <u>in which the desired signal is a function of at least one unknown signal parameter θ and</u> the undesired signal ~~comprising~~ <u>comprises</u> an offset component based on interference of an external interference source;

a modeling code segment configured to cause the computer to model the offset component of the undesired signal as comprising a step function *u* defined by unknown step function parameters <u>that include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude</u>;

an estimating code segment configured to cause the computer <u>to use a non-linear optimization method</u> to determine <u>jointly an estimated signal parameter and</u> estimated step

function parameters representative of the unknown signal parameter θ and the unknown step function parameters c1, c2, and α $(0 \le \alpha < N)$; and

a correcting code segment configured to cause the computer to correct y_n based on the estimated step function parameters.

24. (Currently amended) The computer program of claim [[23]] 46 in which y_n ~~comprises~~ is based on a continuous signal.

25. (Currently amended) The computer program of claim [[23]] 46 in which y_n comprises is based on a discrete signal.

26. (Canceled)

27. (Currently amended) The computer program of claim [[23]] 46 in which the unknown step function parameters include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α indicative of a point at which the step function transitions from the first amplitude to the second amplitude, and in which the desired signal is a function of at least one unknown signal parameter θ.

28. (Currently amended) The computer program of claim 27 in which ~~y_n includes N samples and~~ the estimating code segment further comprises a non-linear optimization code segment configured to cause the computer program to estimate jointly the unknown step function parameters θ, $c1$, $c2$, and α $(0 \le \alpha < N)$ based on a non-linear optimization method.

29. (Currently amended) The computer program of claim 27 in which y_n ~~includes N samples and~~ the estimating code segment further comprises a maximum likelihood code segment configured to cause the computer to estimate the unknown step function parameters $c1$, $c2$, and α $(0 \le \alpha < N)$ based on a maximum likelihood method.

30. (Previously presented) The computer program of claim 29 in which the maximum likelihood code segment is further configured to cause the computer to estimate the unknown step function parameters as comprising:

a first estimate $\hat{c}1$ of $c1$ where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n \,;$$

a second estimate $\hat{c}2$ of $c2$ where

$$\hat{c}2 \approx \frac{1}{N-\hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \text{ ; and}$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 , \; 0 \le \alpha_{Test} < N .$$

31. (Original) The computer program of claim 30 in which the maximum likelihood code segment further comprises:

a selecting code segment configured to cause the computer to select more than one value of α_{Test};

a calculating code segment configured to cause the computer to determine a value g for each selected value of α_{Test} where

$$g \approx \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 ;$$

a g_max code segment configured to cause the computer to select from among the determined values of g one or more maximum values of g; and

an $\hat{\alpha}$_max code segment configured to cause the computer to select $\hat{\alpha}$ based on the one or more maximum values of g.

32. (Original) The computer program of claim 31 in which the selecting code segment is further configured to cause the computer to select less than N values of α_{Test}.

33. (Original) The computer program of claim 29 in which the maximum likelihood code segment is further configured to cause the computer to estimate jointly the unknown step function parameters θ, $c1$, $c2$, and α based on non-linear minimization of a function comprising

$$f(\theta,c1,c2,\alpha)\approx\sum_{n=0}^{\alpha-1}\left|y_n-\frac{1}{\alpha}\sum_{m=0}^{\alpha-1}y_m-\frac{A_0}{2}s_m(\theta)+\frac{1}{\alpha}\sum_{m=0}^{\alpha-1}\frac{A_0}{2}s_m(\theta)\right|^2$$
$$+\sum_{n=\alpha}^{N-1}\left|y_n-\frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha}y_m-\frac{A_0}{2}s_n(\theta)+\frac{1}{N-\alpha}\sum_{m=\alpha}^{N-\alpha}\frac{A_0}{2}s_m(\theta)\right|^2$$

in which the minimization is performed by computing one or more of the derivatives of f.

34. (Currently amended) A processor which:

observes a finite duration signal y_n having N samples that comprises a representation of a mixture of a desired signal and an undesired signal, the undesired signal comprising an offset component based on interference of an external interference source;

models the offset component of the undesired signal as a step function u defined by unknown step function parameters that include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α $(0\le\alpha<N)$ indicative of a point at which the step function transitions from the first amplitude to the second amplitude;

determines estimated step function parameters comprising:

a first estimate $\hat{c}1$ of $c1$ where

$$\hat{c}1\approx\frac{1}{\hat{\alpha}}\sum_{n=0}^{\hat{\alpha}-1}y_n;$$

a second estimate $\hat{c}2$ of $c2$ where

$$\hat{c}2\approx\frac{1}{N-\hat{\alpha}}\sum_{n=\hat{\alpha}}^{N-1}y_n\text{; and}$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 \text{; and}$$

corrects the signal y_n based on the estimated step function parameters.

35. (Currently amended) The processor of claim [[34]] 47 in which y_n ~~comprises~~ is based on a continuous signal.

36. (Currently amended) The processor of claim [[34]] 47 in which y_n ~~comprises~~ is based on a discrete signal.

37. (Canceled)

38. (Currently amended) The processor of claim [[34]] 47 in which ~~y_n includes N samples and~~ the unknown step function parameters include a first parameter $c1$ indicative of a first amplitude of the step function, a second parameter $c2$ indicative of a second amplitude of the step function, and a third parameter α $(0 \le \alpha < N)$ indicative of a point at which the step function transitions from the first amplitude to the second amplitude.

39. (Previously presented) The processor of claim 38 in which the processor estimates the unknown step function parameters as comprising:

a first estimate $\hat{c}1$ of $c1$ where

$$\hat{c}1 \approx \frac{1}{\hat{\alpha}} \sum_{n=0}^{\hat{\alpha}-1} y_n ;$$

a second estimate $\hat{c}2$ of $c2$ where

$$\hat{c}2 \approx \frac{1}{N-\hat{\alpha}} \sum_{n=\hat{\alpha}}^{N-1} y_n \text{ ; and}$$

a third estimate $\hat{\alpha}$ of α where

$$\hat{\alpha} \approx \arg\max_{\alpha_{Test}} \frac{1}{\alpha_{Test}} \left| \sum_{n=0}^{\alpha_{Test}-1} y_n \right|^2 + \frac{1}{N-\alpha_{Test}} \left| \sum_{n=\alpha_{Test}}^{N-1} y_n \right|^2 .$$

40. (Currently amended) The method of claim [[1]] <u>44</u> wherein the desired signal comprises data of interest.

41. (Currently amended) The system of claim [[12]] <u>45</u> wherein the desired signal comprises data of interest.

42. (Currently amended) The computer program of claim [[23]] <u>46</u> wherein the desired signal comprises data of interest.

43. (Currently amended) The processor of claim [[34]] <u>47</u> wherein the desired signal comprises data of interest.

44. (Previously presented) A method comprising:

observing a finite duration signal y_n that comprises a discrete representation, including N samples, of a mixture of a desired signal, an undesired signal comprising an offset component, and a second signal including a generally sinusoidal waveform and an attenuated version of the desired signal;

modeling y_n as including a discrete representation of the desired signal and a discrete representation of an offset component related to a square of the undesired signal, in which the offset component is modeled as comprising a step function *u* defined by unknown step function parameters;

estimating the unknown step function parameters; and

adjusting y_n based on the estimated step function parameters.

45. (Previously presented) A system comprising:

an observation circuit structured and arranged to observe a finite duration signal y_n that comprises a discrete representation, including N samples, of a mixture of a desired signal, an undesired signal comprising an offset component, and a second signal including a generally sinusoidal waveform and an attenuated version of the desired signal;

a modeling circuit structured and arranged to model y_n as including a discrete representation of the desired signal and a discrete representation of an offset component related to a square of the undesired signal, in which the offset component is modeled as comprising a step function *u* defined by unknown step function parameters;

an estimating circuit structured and arranged to determine estimated step function parameters representative of the unknown step function parameters; and

a correction circuit structured and arranged to correct y_n based on the estimated step function parameters.

46. (Previously presented) A computer program stored on a computer readable medium or a propagated signal, the computer program comprising:

an observation code segment configured to cause a computer to observe a finite duration signal y_n that comprises a discrete representation, including N samples, of a mixture of a desired signal, an undesired signal comprising an offset component, and a second signal including a generally sinusoidal waveform and an attenuated version of the desired signal;

a modeling code segment configured to cause the computer to model y_n as including a discrete representation of the desired signal and a discrete representation of an offset component related to a square of the undesired signal, in which the offset component is modeled as comprising a step function u defined by unknown step function parameters;

an estimating code segment configured to cause the computer to determine estimated step function parameters representative of the unknown step function parameters; and

a correcting code segment configured to cause the computer to correct y_n based on the estimated step function parameters.

47. (Previously presented) A processor which:

observes a finite duration signal y_n that comprises a discrete representation, including N samples, of a mixture of a desired signal, an undesired signal comprising an offset component, and a second signal including a generally sinusoidal waveform and an attenuated version of the desired signal;

models y_n as including a discrete representation of the desired signal and a discrete representation of an offset component related to a square of the undesired signal, in which the offset component is modeled as comprising a step function u defined by unknown step function parameters;

determines estimated step function parameters; and

corrects the signal y_n based on the estimated step function parameters.